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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,920	05/19/2006	Ken Sawabe	SOE10021	9014
24203 7590 06/10/2008 GRIFFIN & SZIPL, PC SUITE PH-1 2300 NINTH STREET, SOUTH ARLINGTON, VA 22204				
EXAMINER				
THOMPSON RUMMEL, PONDER N				
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1795				
MAIL DATE		DELIVERY MODE		
06/10/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/595,920

Applicant(s)

SAWABE ET AL.

ExaminerPONDER N. THOMPSON
RUMMEL**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-22 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 19 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action May 2, 2008 has been entered.

Claim Rejections - 35 USC § 112

2. Claim 21 and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The applicant has not shown within the specification why the range of 144-200 mg KOH/g is particularly of greater benefit than any composition that has the acid value range of 45 or 46 mg KOH/g. The data within the experimental section of the specification nor the specification itself does not mention that the acid value of the photosensitive resin is preferred to be between the claimed ranges of 144-200 mg KOH/g nor are there any examples or guidance to this specific range.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohta et al (US 5,476,690) in view of Grubb (US 3,647,467).

With respect to claims 1-6, and 10-20 Ohta et al. discloses a process for preparing a printed circuit board that comprises a light-sensitive resin composition that comprises:

- A. a high molecular weight binder having an acid value of 10 to 46 mg KOH/g (column 4, lines 5-10), a molecular weight between 20,000 and 2000,000 column 5, lines 41-46 and Synthetic Example 4 – column 10, lines 15-21) and in amounts of 40 to 80 parts per weight (column 6, lines 24-26) ;
- B. a compound having a least two polymerizable unsaturated double bond, such as bisphenol A (column 5, lines 55-59), in amounts of 20 to 60 parts by weight (column 6, lines 26-30); and
- C. a photopolymerization initiator, such as a 2,4,5-triarylimidazole dimer (column 6, lines 13-21), in amounts of 0.1 to 10 parts by weight with respect to content of A and B (column 6. lines 31-33).

Ohta et al. further discloses forming a layer of the light-sensitive resin composition of claim 1 onto a substrate (support) (column 6, lines 44-49). However, Ohta et al. does not disclose the compound of formula (1a), (1b), (1c), or (2) of instant claim 1.

Grubb discloses a photoactivatable composition comprising: A binder polymer (column 10, lines 51-75)

- A photopolymerizable compound with at least one ethylenically unsaturated bond (column 12, lines 29-42);
- A photopolymerization initiator such as such as a 2,4,5-triarylimidazolyl dimer (column 3, lines 66-69); and

A heterocyclic sensitizing compound selected from: 2,5-diphenylfuran, 2,5-diphenyl-3,4-dimethylfuran, 2,5-diphenyl-3-ethylfuran, 2,5-di(p-methylphenyl)furan, 2,5-di(2,4-dimethylphenyl)furan, 2,5-di(p-butylphenyl)furan, 2,5-di(p-benzylphenyl)furan, 2-phenyl-5-(p-biphenyl)furan, 2,5-di(p-biphenyl)furan, 2-phenyl-5-(α -naphthyl)furan, 2,5-diphenyloxazole, 2,5-diphenyl-3-methyloxazole, 2,5-di(p-isopropylphenyl)oxazole, 1,4-bis(2-(5-phenyloxazolyl))benzene, 1,4-bis(2-(4-methyl-5-phenyloxazolyl))benzene, 2-phenyl-5-(p-biphenyl)oxazole, 2-phenyl-5-(α -naphthyl)oxazole, 2,5-di(α -naphthyl)oxazole, 1,4-bis(2-(5-phenyloxazolyl))naphthalene, 2,5-di(α -naphthyl)-1,3,4-oxadiazole, 2-phenyl-5-(α -naphthyl)-1,3,4-oxadiazole, 2,5-di(p-t-butylphenyl)-1,3,4-oxadiazole, 2,5-di(4-methyl-1-naphthyl)-1,3,4-oxadiazole, 2-phenyl-5-(p-biphenyl)-1,3,4-oxadiazole, 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-

oxadiazole, and 1,4-bis(2-(5-phenyl-1,3,4-oxadiazolyl))benzene (column 3, lines 31-48). These heterocyclic compounds are used with the initiator to absorb at wavelengths that are not absorbed by the initiator (column 2, lines 17-20). The heterocyclic compounds are useful as light actuated photooxidants and which can significantly increase the compositions total absorption of usable light during exposure (column 3, lines 57-64) and further provide better optical quality and imaging speed than commercial radiation sources (column 1, lines 44-54).

Therefore, it would have been obvious to one of ordinary skill within the art at the time of the invention to include the uses of a heterocyclic compound as disclosed by Grubb within the light sensitive resin composition of Ohta et al. to improve optical quality, light absorption and imaging speed.

With respect to claims 6 and 16-19, Ohta et al. further discloses forming a layer of the light-sensitive resin composition of claim 1 onto a substrate (support) (column 6, lines 44-49).

With respect to claim 7, Ohta et al discloses a method of forming a negative pattern comprising:

- A. laminating a light-sensitive element that consist of a layer of the light-sensitive resin composition onto the surface of the substrate (column 7, lines 1-3);

- B. imagewise irradiating the light sensitive composition with active light (column 7, lines 16-26); and
- C. developing the substrate (column 7, lines 55-57)

With respect to claim 8, Ohta et al further discloses a process for preparing a printed circuit board by electroless copper plating by using the negative pattern of the light-sensitive resin composition (column 8, lines 11-18) as formed in claim 7.

5. Claim 1-6 and 10-20 rejected are under 35 U.S.C. 103(a) as being unpatentable over Amanokura et al in view of Grubb.

With respect to claims 1-6, and 10-20 Amanokura et al. discloses a process for preparing a printed circuit board that comprises a light-sensitive resin composition that comprises:

- A. a high molecular weight binder having an acid value of 50-77 KOH/g (see Synthesis Examples 4, 6 and 7, columns 21 and 22), a molecular weight between 30,000 and 100,000 (column 14, lines 9-11) and in amounts of 20 to 90 parts per weight (column 15, lines 12-24) ;
- B. a compound having ethylenically unsaturated double bond, such as 2,2-bis(4-methacryloxyethoxyphenyl) propane, 2,2-bis(4-acryloxyethoxyphenyl) propane and bisphenol A (column 14, lines

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14-27), in amounts of 5 to 80 parts by weight (column 15, line 15);

and

C. a photopolymerization initiator, such as a 2,4,5-triarylimidazole dimer (column 14, lines 54-67), in amounts of 0.1 to 10 parts by weight with respect to content of A and B (column 15, lines 16-17).

However, Amanokura et al. does not disclose the use of a compound of formula (1a), (1b), (1c), or (2) of applicant's claim 1.

Grubb discloses a photoactivatable composition comprising: A binder polymer (column 10, lines 51-75)

- A photopolymerizable compound with at least one ethylenically unsaturated bond (column 12, lines 29-42);
- A photopolymerization initiator such as such as a 2,4,5-triarylimidazolyl dimer (column 3, lines 66-69); and

A heterocyclic sensitizing compound selected from: 2,5-diphenylfuran, 2,5-diphenyl-3,4-dimethylfuran, 2,5-diphenyl-3-ethylfuran, 2,5-di(p-methylphenyl)furan, 2,5-di(2,4-dimethylphenyl)furan, 2,5-di(p-butylphenyl)furan, 2,5-di(p-benzylphenyl)furan, 2-phenyl-5-(p-biphenyl)furan, 2,5-di(p-biphenyl)furan, 2-phenyl-5-(α -naphthyl)furan, 2,5-diphenyloxazole, 2,5-diphenyl-3-methyloxazole, 2,5-di(p-isopropylphenyl)oxazole, 1,4-bis(2-(5-phenyloxazolyl))benzene, 1,4-bis(2-(4-methyl-5-phenyloxazolyl))benzene, 2-phenyl-5-(p-biphenyl)oxazole, 2-phenyl-5-(α -naphthyl)oxazole, 2,5-di(α -naphthyl)oxazole, 1,4-bis(2-(5-phenyloxazolyl))naphthalene, 2,5-di(α -naphthyl)-

1,3,4-oxadiazole, 2-phenyl-5-(α -naphthyl)-1,3,4-oxadiazole, 2,5-di(p-t-butylphenyl)-1,3,4-oxadiazole, 2,5-di(4-methyl-1-naphthyl)-1,3,4-oxadiazole, 2-phenyl-5-(p-biphenyl)-1,3,4-oxadiazole, 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-oxadiazole, and 1,4-bis(2-(5-phenyl-1,3,4-oxadiazolyl))benzene (column 3, lines 31-48). These heterocyclic compounds are used with the initiator to absorb at wavelengths that are not absorbed by the initiator (column 2, lines 17-20). The heterocyclic compounds are useful as light actuated photooxidants and which can significantly increase the compositions total absorption of usable light during exposure (column 3, lines 57-64) and further provide better optical quality and imaging speed than commercial radiation sources (column 1, lines 44-54).

Therefore, it would have been obvious to one of ordinary skill within the art at the time of the invention to include the uses of a heterocyclic compound as disclosed by Grubb within the light sensitive resin composition of Amanokura et al. to improve optical quality, light absorption and imaging speed.

Response to Arguments

6. Applicant's arguments, see pages 9-11, filed May 2, 2008, with respect to claims 1, 2, and 20 under 35 USC 102(b) have been fully considered and are persuasive. The rejection of claims 1, 2 and 20 has been withdrawn.
7. Applicant's arguments, see pages 11-19 filed May 2, 2008 with regards to claims 1-20 under 35 USC 103(a) have been fully considered but they are not persuasive. Applicant argues that Grubb does not disclose the acid value as recited within claims 1-

20. Applicant suggests that Ohta teaches away from having acid values higher than 46 KOH/g. However, the acid value as claimed by Ohta still lies within the claimed range of 45-200 mg KOH/g. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed.Cir. 1990).

8. Additionally, even though the acid range as shown in Ohta may be on the lower end of the claimed range, the applicant has not shown within the specification or declaration why the range of 144-200 mg KOH/g is particularly of greater benefit than any composition that has the acid value range of 45 or 46 mg KOH/g.

9. Applicant also argues that there is no reason to combine Ohta and Grubb together. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Ohta in view of Grubb, does disclose the claimed binder with an acid value within the claimed ranges. The addition of such heterocyclic sensitizing compounds as disclosed by Grubb would improve sensitivity (therefore calling the heterocyclic compound a "sensitizing compound, see column 3, lines 49-65) of the resist as well as limiting contamination by

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maintaining the claimed acid value. For this reason, it would be obvious for one of ordinary skill to include the heterocyclic compound as disclosed by Grubb within the composition of Ohta to obtain such results.

10. Finally, a new rejection has been made with Amanokura in view of Grubb wherein Amanokura discloses the photosensitive composition having a higher acid value than that of Ohta wherein the acid value is between 50 and 70 mg KOH/g.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PONDER N. THOMPSON RUMMEL whose telephone number is (571) 272-9816. The examiner can normally be reached on Monday-Friday 7:00 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. N. T./
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795